


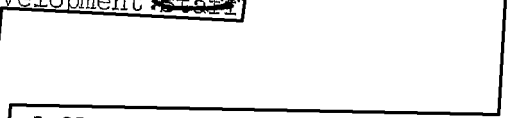

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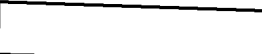
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20 December 1963

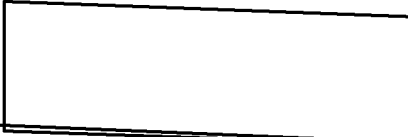
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MEMORANDUM FOR: Assistant for Plans and Development 
THROUGH : Chief, Development Branch 
SUBJECT : Letter Contract  of 27 June 1963; Coherent
Light Enlarger

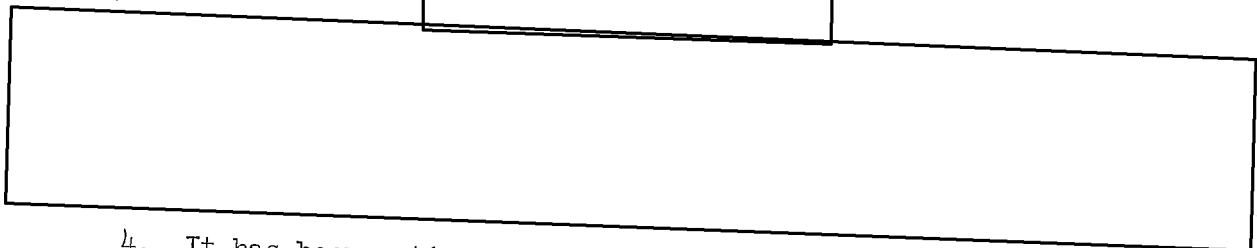
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1. A conference was held  on 19 December 1963 regarding the status of the subject contract. Those in attendance were:

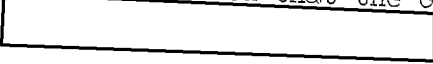
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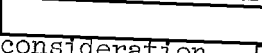
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4. It has been estimated that the contract will underrun the original contract price 

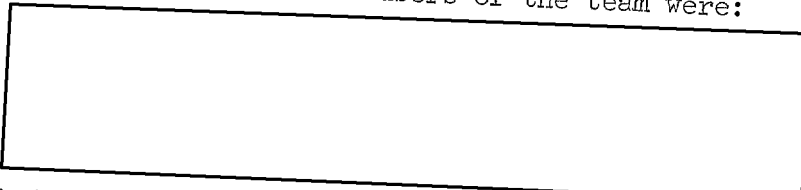
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5. Completion of final optical elements is expected early in February 1964. Several mechanical components to be included in the prototype are currently being fabricated. The control panel is currently being designed. A verbal description of the panel  indicates that human engineering is being given major consideration. The fluid gate is currently in fabrication.

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6. Late in September 1963 an inspection team visited the  plant for a physical review of progress. Members of the team were:

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a. During that review many prints were displayed to illustrate capabilities of the breadboard coherent light enlarger to that date. Print results generally were disappointing because of consistent

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interference rings in all sample prints shown. It was unanimously agreed that such diffraction patterns would not be tolerated in intelligence photography because they would add prohibitively to the already difficult task of photo-interpreters. Other than the objectionable interference patterns, the sample prints appeared to be high in resolution and acutance.

b. At that time [] felt that the interference rings could be minimized by a diffusion disk in the light path of the enlarger but was not prepared to estimate what the trade-off might be in terms of the modulation transfer function.

c. Since the September meeting, however, new work as reported [] seems to indicate a strong probability that the interference pattern is not caused directly by the laser, but is due to lens defects, primarily in the surface, that can be eliminated.

d. The following appear to verify the above tentative conclusion:

(1). A polaroid exposure was made by direct laser illumination at a distance of 30 feet through a pin point aperture and did not produce interference rings.

(2). A incandescent source focused on a pinhole through the laser enlarger optics did produce interference rings on the print. Exposures were four (4) hours, as compared to two (2) second laser exposures.

(3). Concentric rings in the surfaces of lenses have been discovered to be a common experience of lens makers and polishers at []. The lens people at [] report that these can be removed rather readily by very fine and meticulous polishing. They report further that these are almost always disregarded because there has been no previous requirement of sufficiently critical nature to justify the expense of removal, or polishing out.

7. [] brought along several original and resulting prints of resolution targets. These were examined under magnification. All sample prints were produced on the laser enlarger at 3.5 diameter enlargement. A 128 l/mm low contrast target reproduced at 32 l/mm. No low contrast targets beyond 128 l/mm could be read. A 228 l/mm high contrast target reproduced at 57 l/mm. Assuming that [] conversion figures are correct, these resolution results slightly exceed those expected in the breadboard phase.

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a. [redacted] stated that all resolution test prints were made through a diffusion disk and with a pinpoint aperture placed in the laser light path. He maintains that no appreciable loss in resolution resulted but that the interference rings have been virtually eliminated. He prefers to defer answers to questions on the possible adverse effect on the modulation transfer function until such specific curves have been plotted.

b. The diffusion disk employed was a flat circular glass plate, ground on one side and rotated in the light path at 60rpm. The disk increased the exposure by a factor of 4X.

c. The resolution targets were printed on SO-136 film. The samples were left with us [redacted] will be asked to have comparison prints made on the [redacted] 10-20-40X enlarger.

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8. Action Taken [redacted] was instructed to:

a. Continue work in accordance with the pert chart.

b. Provide additional graphic material of a continuous tone type, with resolution targets inserted, to demonstrate the elimination of interference rings without loss of resolution.

c. Provide modulation transfer function data with and without the diffusing filter in the system.

d. Provide a series of graphic materials in 3 $\frac{1}{4}$ " x 4" slide form that would be suitable for briefing purposes. Such material should depict the development evolution of the enlarger.

e. Include a time clock and five (5) digit non-resetable counter on the enlarger to record hours of operation and cycles of operation for equipment-use records.

9. The next in-plant inspection was tentatively planned for late in January 1964.



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